

**ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΙΑΣ**  
**ΤΜΗΜΑ ΜΗΧΑΝΙΚΩΝ ΧΩΡΟΤΑΞΙΑΣ ΚΑΙ ΠΕΡΙΦΕΡΕΙΑΚΗΣ ΑΝΑΠΤΥΞΗΣ**

## **ΣΕΙΡΑ ΕΡΕΥΝΗΤΙΚΩΝ ΕΡΓΑΣΙΩΝ**

**THE SPATIAL ASPECTS OF ENTERPRISE  
LEARNING IN TRANSITION COUNTRIES**

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**George Petrakos and Maria Tsiapa**

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# The Spatial Aspects of Enterprise Learning in Transition Countries<sup>1</sup>

by

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ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΙΑΣ  
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# **The Spatial Aspects of Enterprise Learning in Transition Countries**

## **Introduction**

Transition in Central and Eastern European countries (CEECs) is a unique historic process, where a large number of countries have replaced in a relatively short period of time and often in an abrupt way, a system of production and distribution based on central planning, by one based on the market. Despite early euphoria for spontaneous adjustment, this ten-year long process has proven harder and longer than initially thought. Recent estimates (Jackson and Petrakos 1999) indicate that most CEECs had in 1997 GDP and industrial output levels that were still below the 1989 figures. As a rule, the industrial sector in all countries is behind GDP in terms of growth rates and in terms of reaching 1989 figures. One interesting – but often neglected - message of this record is that, no matter how successful or unsuccessful a transition country is considered to be, eventually it requires time to adapt in a satisfactory way to the new conditions. To be precise, it requires ‘learning’ time.

Available evidence indicates that performance and – one can assume – learning are highly differentiated across geographical space. Despite the fact that transition policies become more homogeneous, the outcomes of these policies seem to become more varied over time (Murrell 1996). Cases of success and failure have been reported and analyzed at several levels. At the national level, Central European countries have fared better in terms of performance and structure than the Balkans (Petrakos and Totev 1999, Jackson and Petrakos 1999, Mertzanis and Petrakos 1998), while at the regional level, core and western border regions have shown a systematically better than average performance (Petrakos, 1998, Downes 1996, Raagmaa 1996).

At the macro level, several explanations have been advanced to account for these differences in performance. Success has been associated with an early and steady implementation of reforms, historical experience with market structures, favorable geographical coordinates and more favorable economic and industrial structures. Failure, on the other hand, has received several, often complementary but also conflicting explanations. "Policy failure" explanations, following mainstream economic thinking, attribute poor transition performance to delayed reforms and non-persistent policies of privatization and market liberalization. At the other extreme, "market failure" explanations consider the "shock therapy" of massive privatization, trade liberalization and deregulation in the absence of appropriate institutional arrangements as the primary factor explaining repeated crises in a number of

transition countries. Other explanations point to different initial conditions with respect to economic structure, infrastructure and human capital development, or different conditions with respect to geographical features such as proximity and accessibility to major European markets, that affect capital mobility and the diffusion of technology and know-how. Finally, one cannot ignore the negative impact of ethnic tensions and the war in Bosnia and Kosovo.

When, however, the focus of the discussion turns to the new private firms, the arguments and the literature become rather anemic. What factors explain success and failure at this level? Where does entrepreneurial knowledge come from in transition countries, through which channels and how is it transmitted to the new firms? How fast are 'best practice' paradigms diffusing in space? Given the total lack of entrepreneurial knowledge and culture in many of these countries and the highly centralized nature of the planning system in operation for decades, it becomes evident that a crucial factor concerning the performance of the private sector is related to the firms' learning processes.

Given the variations in performance among countries and regions, it may be the case that, besides the reported impact of macroeconomic, macro-geographical and institutional factors mentioned before, some places possess a more favorable combination of factors facilitating enterprise learning than others. This paper analyzes the sources of enterprise learning under transition, using the results of a recent survey conducted in six CEE countries. Our goal is threefold: to identify the most significant sources of enterprise learning under transition, to examine for the existence of significant spatial variations in learning processes and finally to discuss the implications of our findings for transition policies.

This paper is organized as follows. In the following section we present a review of theory and evidence with respect to the sources of enterprise learning, while in section 3 we discuss the results of our survey, putting an emphasis on the spatial aspects of learning in transition. In section 4 we present the results of an econometric model estimating the impact of the various types of learning on some aggregate measures of enterprise performance and in section 5 we present our conclusions.

## **2. Enterprise learning: a review of theory and evidence**

The process of transition provides a unique opportunity to put forward and test a number of hypotheses concerning learning. While in the pre-1989 period managers ran firms under central planning with limited degrees of freedom in decision making, transition gradually introduced a new economic environment that provided opportunities for market based actions that, however, required knowledge not existing before. As a result, continuous adaptation and change is inevitable for new private firms today, as they operate in an increasingly unregulated, unprotected and highly competitive environment. Coping with such changes requires continuous learning (Dodgson and Bessant 1996), which in the long-run is perhaps the only sustainable source of competitive advantage for firms, organizations and individuals (Stata 1989).

Learning, which takes place through a cycle of experience, conceptualization and experiment, is neither automatic, nor passive. Firms, or individuals, have to actively



seek to learn, devoting time and resources (Dodgson and Bessant 1996). In addition, the environment in which they operate must encourage and facilitate learning through the provision of required information, links and interaction among economic actors. Local and regional environments increasingly play a role in supporting learning and networking. A great deal of research has been investigating the links between the emergence of local and regional clusters of successful innovative industries and the process of evolution and learning. (Konstandakopoulos 1997). Comparisons of successful cases of learning regions, such as Southern Germany, Emilia-Romana in Italy, Ile-de-France and California indicate that there is no single path to regional development (Asheim 1996, Storper 1993). It has now being realized that the ability of firms and regions to learn is conditioned by the interaction of a large number of social, economic and technical factors (Sternberg 1996).

Interpreting the existing literature, one could argue that there are three possible and often interacting ways of learning for a firm: (a) intra-firm learning or learning by doing, (b) learning from the environment or learning from others and (c) learning from networks or inter-firm learning. In the remainder of this section we are going to examine more closely these sources of learning, reviewing the available evidence and shedding some light on their spatial dimension.

### *Learning by doing*

Learning by doing or intra-firm learning is considered to be an important source of knowledge, know-how, innovation and successful firm operation. It is usually related to the qualitative and quantitative characteristics of a firm, such as the quality of human resources, experience (as a function of age), economies of scale (as a function of size), managerial competence, existence of specialized staff or departments engaged in R&D activities, etc.

Foster and Rozenzweig (1995), in their study of Indian farmers, showed that learning by doing effects were present and significant, as experience was found to improve the ability of farmers to make appropriate decisions. In another study, Harris and Trainor (1997) provided evidence that experience, measured by the age of the firm, was a significant factor affecting inventive activities in Northern Ireland manufacturing, while the size of the firm had no significant impact. Similarly, Konstandakopoulos (1997), in his study of two peripheral British regions, reports that the age of the firms and the existence of an R&D department were factors significantly affecting learning and innovation activity.

### *Learning from the environment*

Enterprise learning is to a large extent a function of activity clustering (Audretsch and Feldman 1996). As a result, learning from the environment is very similar to agglomeration economies, understood as external economies of scale. This concept describes spillover effects or benefits accruing to firms from the territorial concentration of supporting organizations (Asheim 1996), or the close coupling of industry and the research base of a region (Dodgson and Bessant 1996).

According to Garnsey (1998), the role of the local science base is a key factor in the production and diffusion of new knowledge. She identifies several institutions, such as: (a) a leading scientific University and the associated research complex, (b) a prestigious science or industrial park, (c) Public support for innovation technology and (d) a facilitating labour market providing the required skills, as very important knowledge generating factors. These institutions act as catalysts in the local or regional economy, by increasing the density of economic interaction and improving the diffusion of information, which promote learning. In a similar manner, it has been argued, that the success of the Italian industrial districts can be attributed, among other things, to the support local firms enjoyed from regional institutions, that manage to stimulate innovation and learning (Amin and Robins 1990, Petrakos, 1997).

Turning to empirical findings, Foster and Rozenzweig (1995), report in their study of Indian farmers, evidence that learning from others effects were present and significant in the form of learning spillovers, attributed to the presence of experienced neighbours. Similarly, Harris and Trainor (1997) find that innovative activity in Northern Ireland is positively affected by agglomeration economies. On the other hand, Konstandakopoulos (1997) in his study of two peripheral British regions reports that, local firms considered the importance of regional support systems (regional and local government, Universities, Chambers, Euro-info centers development agencies, etc) as insignificant.

### *Learning from networks*

Several definitions are available for networks. According to Lakshmanan and Okumura (1995), networks represent a set of selective and explicit linkages between one firm and others with which it has technological and marketing relations, aiming at mutual advantages. Such linkages may take a material or a non material form and include supplier-user relationships, subcontracting, production sharing, joint ventures, licensing agreements, R&D collaboration, etc. According to Zuscovitch and Justman (1995), networks represent an intermediate form of relationship between market transactions on the one hand and full integration within a single firm. In network organizations, 'firms preserve their identity and are free to operate in the open market, but find it to their advantage to maintain a long-term relationship with their partners, fostering mutual confidence and cooperation' ( p. 269).

From a different point of view, Castels (1996) defines networks as a new social morphology that substantially modifies the operation and outcomes in processes of production, experience, power and culture. According to him, firms and increasingly organizations and institutions are organized in networks of variable geometry, whose intertwining supersedes the traditional distinction between corporations and small firms, cutting across sectors and spreading along different geographical clusters of economic units. The latter, broader definition (including firms, organizations and institutions) has prompted some researchers to claim that networks are generally equivalent to agglomeration economies available through optimal location in geographic space (Bergman 1991 cited in Sternberg 1996).

In any case, there is an agreement that networks are a new type of industrial organization capable of dealing better with collective learning when the information

intensity increases. This function of networks to expand learning horizons and promote adaptation and learning in a complex system, is considered to be a very important one (Zuscovitch and Justman 1995, Dodgson and Bessant 1996, Garnsey 1998). Empirical research such as that of Saxenian (1991) in Silicon Valley, or Amin and Robins (1990) in the Italian industrial districts, shows the innovative and learning advantages of such networks organizations.

Some researchers have advanced the concept of innovative local milieu to describe a complex network of mainly informal social relationships in a limited geographical area. In addition to the properties discussed above, the local milieu often determines a specific external image and a specific internal 'representation' and sense of belonging, which encourage and promote collective learning processes at the local level (Camagni 1991). The analysis of the agents oriented networks is clearly older than that of the regions oriented milieu. However, within the framework of the milieu approach, the concept of network is given an explicit regional context and it is extended to include a large number of very different forms of interconnections between firms (Sternberg 1996). In the milieu approach, networks, besides facilitating learning and information sharing, also mediate conflicts and generate trust among local actors, as social and political factors often matter far more than either technology or economic capability for regional growth (Konstandakopoulos 1997).

### *The spatial aspects of learning processes*

Although the available evidence is limited, the literature seems to be in agreement that geography plays an important role in the process of enterprise learning. In general the diffusion of knowledge seems to be a function of activity clustering or density, proximity and distance. Krugman (1991) has indicated that the cost of transmitting knowledge rises with distance, and therefore proximity and location are important factors determining learning processes. Dense interactions among firms or between firms and institutions require the presence of a critical number of activities. Proximity provides advantages to firms in the form of shared knowledge through face to face interaction, while some learning depends on institutions that are selectively located in space (Garnsey 1998).

Although all stories of success in the new industrial spaces literature indirectly point to the significance of activity clustering and the role of geography (Storper 1993), recent evidence from two peripheral British regions shows that distance from London is a critical factor impeding inventive activity, drastically reducing knowledge spillovers and information flows density (Konstandakopoulos 1997). In addition, another study shows that innovative activities tend to cluster in space more intensively than the other industrial activities, because of the role of knowledge spillovers generated by R&D, skilled labour and University research (Audretsch and Feldman 1996)



### 3. A survey of manufacturing enterprises in transition economies: market knowledge and spatial patterns of learning

This survey was conducted within the framework of an EU Phare-ACE program (Project P96-6202-R) in six Central and East European countries during the period May – August 1998. The goal of the survey was to evaluate the importance of location specific aspects of enterprise learning in the transition process. Given that this issue has not received much attention in the transition literature, it is hoped that our findings will stimulate some discussion and further research in the near future. In this section we first present briefly the methodology of the survey and the basic characteristics of the generated database and then discuss in some detail and in a manner compatible to our taxonomy, the spatial aspects of enterprise learning.

#### Methodology of the survey

The goal of the survey was to use a multinational sample in order to shed light onto the spatial aspects of enterprise learning under transition. The focus of the survey was the behavior and performance of *de novo* manufacturing enterprises in six transition countries. The research team collected 399 questionnaires from (a) capital regions, (b) border regions with western European countries and (c) other regions in Estonia, FYROM, Hungary, Poland, Romania and Slovenia (Table 1). The questionnaire included 61 closed questions requiring single or multiple answers about (a) the profile of the enterprise, (b) the human resources, (c) the economic environment, (d) the economic relations and (e) the factors affecting the performance of the enterprise.

**Table 1. Sample Size by Country and Type of Regions (Number of Enterprises)**

| Regions by Type | Country |       |         |        |         |          | Total |
|-----------------|---------|-------|---------|--------|---------|----------|-------|
|                 | Estonia | FYROM | Hungary | Poland | Romania | Slovenia |       |
| Capital regions | 30      | 25    | 18      | 21     | 28      | 30       | 149   |
| Western Border  | -       | 10    | 19      | 11     | -       | 17       | 59    |
| Other           | 30      | 34    | 33      | 36     | 40      | 17       | 191   |
| Total           | 60      | 69    | 70      | 68     | 68      | 64       | 399   |

According to our initial plans, the geographical distribution of the firms' sample should be about 40-50% from the capital city, 20% from the western border regions of the country and about 30-40% from the rest of the country. It was also decided at the beginning that questionnaires would be anonymous and that a maximum effort would be made so that they were completed in full, as missing data reduce the degrees of freedom for any type of statistical analysis.

The vast size of the enterprise sector in these countries and the limitations of the project budget made it clear from the very beginning that we would not be able to claim a representative sample. Getting that requires a much larger number of enterprises and a much larger budget. The research team made a significant effort however, to collect reliable information at the enterprise level from random national samples. This was possible in some, but not all countries. The project participants from Estonia, FYROM and Romania met greater difficulties in convincing randomly selected firms to respond to questionnaires and felt that the validity of some responses



was not granted. As a result, in these countries the interviewers decided to select a part of the enterprises participating in the sample on the basis of their willingness to participate in the survey and the reliability and quality of their responses. As a result, some countries (Hungary, Poland and Slovenia) participate in the survey with a random sample, while some others (Estonia, FYROM and Romania) participate with a sample that is both random and selective, in proportions that depend on the difficulties met in collecting reliable information<sup>4</sup>.

Despite the obvious constraints of such a multinational project and the difficulties in obtaining sensitive firm level information in an uncertain economic environment and a period characterized by rapid change and fluidity, the survey was eventually successful. The generated database allows us for the first time to empirically examine the importance of the various sources of learning under transition. Given however the small size of our sample and the national differences in sampling methods, we do not attempt to make national comparisons with respect to enterprise learning. We restrict our analysis to the spatial characteristics of learning, by comparing the responses collected in the capital and border regions to each other and to those of the total sample.

#### The characteristics of the data base

In Table 2, we present summary information about the spatial and structural characteristics of our database. About 37% of the total number of firms operate in the capital regions of the six countries (Talin, Skopje, Budapest, Warsaw, Bucharest and Ljubljana), about 15% operate in western NUTS III level regions that share common borders with an EU country and 48% operate in other regions. This geographical distribution is somehow different from the one planned, due to variations in the response ratio of the randomly selected samples.

In terms of sectoral characteristics, 46% of the firms operate in consumer sectors, 22% in intermediate sectors and 31% in capital sectors. In terms of size, 29% of the firms have fewer than 10 employees, 53% have more than 10 and fewer than 100 and 16% of the firms have more than 100 employees.

Finally, in terms of age, 12% of the firms have been operating for 1-3 years in the market, 63% of the firms have been operating for 4-7 years and 25% of the firms have been operating for more than 8 years in the market. The latter category includes firms mainly from Poland and Hungary that, besides introducing reforms relatively early, already possessed some private sector experience before transition.

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<sup>4</sup> For more information concerning the sampling method used by each individual country see the final report of the project "Location Specific aspects of Learning and the Transfer of Know-how in Transition, Phare-ACE Project P96-6202-R, Leuven Institute for Central and East European Economics.

**Table 2. The spatial and structural characteristics of the data base**

|   |  | <i>Number</i> | <i>Share</i> |
|---|--|---------------|--------------|
| <i>Total number of firms</i>                                  |  | 399           | 100,00       |
| <i>Firms operating in</i>                                     | <i>Estonia</i>                                   | 60            | 15,04        |
|   | <i>The Former Yugoslav Republic of Macedonia</i> | 69            | 17,29        |
|   | <i>Hungary</i>                                   | 70            | 17,54        |
|   | <i>Poland</i>                                    | 68            | 17,04        |
|   | <i>Romania</i>                                   | 68            | 17,04        |
|   | <i>Slovenia</i>                                  | 64            | 16,04        |
| <i>Firms operating in</i>                                     | <i>capital regions</i>                           | 149           | 37,34        |
|   | <i>western border regions</i>                    | 59            | 14,79        |
|   | <i>other regions</i>                             | 191           | 47,87        |
| <i>Firms operating in</i>                                     | <i>consumer sectors</i>                          | 183           | 45,86        |
|   | <i>intermediate sectors</i>                      | 88            | 22,06        |
|   | <i>capital intensive sectors</i>                 | 124           | 31,08        |
| <i>Micro firms (employment <math>\leq 10</math>)</i>          |  | 117           | 29,32        |
| <i>Small firms (10 &lt; employment <math>\leq 100</math>)</i> |  | 210           | 52,63        |
| <i>Large firms (employment &gt; 100)</i>                      |  | 64            | 16,04        |
| <i>Firms with</i>   | <i>1-3 years of operation in 1998</i>            | 47            | 11,78        |
|   | <i>4-7 years of operation in 1998</i>            | 251           | 62,91        |
|   | <i>Over 8 years of operation in 1998</i>         | 98            | 24,56        |

### The spatial aspects of learning

Earlier analysis has indicated that there are at least three sources of enterprise learning: (a) internal or by doing, (b) from others or the environment and (c) from networks. In this section we examine the spatial aspects of the various types of enterprise learning on the basis of the results of the survey. We are interested in seeing whether the reaction of the firms located in the capital or border regions is on average different from that of the total sample. Also we are interested in looking for spatial variations in the self-evaluation of market knowledge by the firms and in success in implementing changes in the firms' products or processes.

## *Learning by doing*

In Table 3 we present information concerning the spatial aspects of enterprise characteristics related to internal learning or learning by doing. This information is related to (a) a number of qualitative characteristics of the entrepreneur/manager of the firm (age, education, training, international experience or contacts), (b) the qualitative characteristics of the employees, (c) the existence of R&D or product design department in the firm and (d) the quality of labour-management relations within the firms.

**Table 3. Spatial aspects of Enterprise characteristics related to internal learning or learning by doing**

| <i>Enterprises characteristics:</i>  | <i>Share of firms operating in:</i> |                        |                     |
|--|-------------------------------------|------------------------|---------------------|
|  | <i>Capital region</i>               | <i>Western borders</i> | <i>Total sample</i> |
| <i>Entrepreneur/manager under 40 years old</i>                                 | 44,96                               | 35,59                  | 36,34               |
| <i>Entrepreneur/manager with post-secondary education</i>                      | 81,88                               | 67,80                  | 77,19               |
| <i>Entrepreneur/manager that has studied abroad</i>                            | 14,77                               | 1,69                   | 8,77                |
| <i>Entrepreneur/manager speaking at least one foreign language</i>             | 100,00                              | 100,00                 | 97,49               |
| <i>Entrepreneur/manager speaking two or more foreign languages</i>             | 56,38                               | 28,81                  | 42,36               |
| <i>Entrepreneur/manager that has visited two or more western countries</i>     | 75,17                               | 74,58                  | 73,18               |
| <i>Entrepreneur/manager that has worked in a western country before</i>        | 26,85                               | 18,64                  | 19,30               |
| <i>Entrepreneur/manager that reads international newspapers or magazines</i>   | 59,73                               | 45,76                  | 50,13               |
| <i>Entrepreneur/manager that has attended training programs</i>                | 61,74                               | 52,54                  | 59,65               |
| <i>Average share of employees possessing a University degree</i>               | 25,16                               | 12,50                  | 17,83               |
| <i>Existence of department or staff dedicated in R&amp;D activities</i>        | 35,57                               | 22,03                  | 30,83               |
| <i>Existence of department or staff dedicated to product design activities</i> | 45,64                               | 40,68                  | 41,35               |
| <i>Existence of internal training programs for the employees</i>               | 53,69                               | 50,85                  | 54,89               |
| <i>Existence of good management-labour relations within the firm</i>           | 99,33                               | 93,22                  | 94,49               |

Generally speaking, the responses at the sample level are satisfactory. Significant shares of the entrepreneurs/managers of the sample have received post-secondary education (77%), have studied abroad (8%), speak one (97%) or more foreign languages (42%), have worked in a western country before (19%), read international newspapers and magazines (50%) and have attended training programs (59%). On average, 17% of the employees of the firms possess a University degree, while 54% of the firms have internal training programs. A significant share of the firms has a department or staff dedicated to R&D activities (30%) and product design activities (41%). Finally, the overwhelming majority (94%) of the firms reports good labour-management relations.

These figures tend to indicate that a large share of firms possesses such human resources and characteristics as can potentially facilitate internal learning processes. This seems to be in line with the historical experience of these countries, as

enterprises under central planning were obliged, in the absence of markets or market related institutions to rely more on an internal division of labour to generate sustainable operation and knowledge.

Turning to the spatial aspect of these characteristics, we observe significant differences between the average figures and the figures of capital and western regions. The first observation is that capital region firms tend to have a superior performance than average (and what is more important) than western border regions in all indicators. In some instances, these differences are especially strong. Capital region firms seem to attract in a higher propensity entrepreneurs/managers that have studied abroad (14%) than border regions (1%), or entrepreneurs/managers that speak more than two foreign languages (56% and 28% respectively). Also capital region firms seem to operate with a more educated labour force (25% possess a University degree) than border regions (12% possess a University degree) and have in larger proportions departments or staff dedicated to R&D activities (35% and 22% of the firms respectively).

The second observation is that firms in western regions bordering with EU countries in general do worse than average. They seem to possess significantly lower shares of entrepreneurs/managers with post-secondary education, having studied abroad or speaking several foreign languages. In fact, in every single indicator of internal learning, the enterprises at the western borders seem to have a more or less inferior figure not only compared to those located in the capital regions, but also compared to the entire sample.

This finding has important implications for the growing regional transition literature, which has indicated that western border regions can take advantage of their proximity to EU markets and attract economic activity in the form of FDI, joint ventures, cross border trade, intra-firm trade, etc (Petrakos 1998). It indicates that at the firm level, the advantage of proximity to western markets is more than offset by the disadvantage of perimetric location with respect to the national market when the qualitative characteristics of human resources are concerned. As a result, internal learning has greater chances to be more effective in the capital regions (or even the rest of the country) than in border regions, for reasons that are most likely related to the attractiveness exerted by various places to mobile resources.

### *Learning from the environment*

In Table 4 we present some of the characteristics of the firm and its environment that are related to learning from others or learning spillovers. We present information for average Gross Regional Product<sup>5</sup> (GRP) of the capital regions, western border regions and the total number of regions hosting the firms of our sample. We also present information about the average size of the cities in which the firms of our sample are

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<sup>5</sup> Data on GRP per head at the NUTS III level is collected from national sources in national currencies. To get a measure of GRP per head in USD we work as follows: On the basis of available figures, we construct an index of regional inequalities, such that the national average in all countries is equal to 100. Then we multiply this index by the GDP per head figure provided for each country by the World Bank "World Development Report 1998/99". The result is a new regional variable that measures GRP per head in USD in each country.



located. These two indicators intend to capture agglomeration economies that are external to firms, accruing from the higher concentration of economic activities in the area. Larger (in terms of population) and more developed (in terms of GRP) markets are normally related to greater opportunities for external economies of scale and external learning or learning from the environment. Comparing GRP per head and population size for the capital and border regions of our sample we see that the capital region firms have the advantage of being located in markets where learning spillovers from agglomeration economies are likely to be higher. On the other hand, border region firms have the disadvantage of being located in market places that are smaller in size and less advanced in terms of activities than the region hosting the average firm of our sample.

**Table 4. Spatial aspects of Enterprise characteristics related to learning from others, or learning from the environment**

| <i>Enterprises characteristics:</i>   |                                  | <i>Share of firms operating in:</i> |                        |                     |
|---|----------------------------------|-------------------------------------|------------------------|---------------------|
|   |                                  | <i>Capital region</i>               | <i>Western borders</i> | <i>Total sample</i> |
| <i>Average Gross Regional Product (GRP) per head in USD (1996)</i>            |                                  | 6604                                | 3856                   | 4339                |
| <i>Average city size (in thousand inhabitants)</i>                            |                                  | 757,583                             | 116,229                | 349,819             |
| <i>Enterprises preferring the city in which they are located to be larger</i> |                                  | 16,78                               | 33,90                  | 31,33               |
| <i>Enterprises preferring to be located in a different city</i>               |                                  | 5,37                                | 25,42                  | 18,80               |
| <i>The firm has received assistance from:</i>                                 | <i>Universities</i>              | 18,79                               | 15,25                  | 16,79               |
|   | <i>Research Centres</i>          | 24,83                               | 11,86                  | 18,80               |
|   | <i>Business Service Centres</i>  | 14,77                               | 10,17                  | 16,04               |
|   | <i>Chambers of Industry</i>      | 44,30                               | 32,20                  | 41,60               |
|   | <i>Employers Association</i>     | 20,13                               | 3,39                   | 15,29               |
|   | <i>Local/regional Government</i> | 29,53                               | 20,34                  | 32,83               |
|   | <i>Local Banks</i>               | 63,09                               | 42,37                  | 57,14               |
|   | <i>Development Agencies</i>      | 12,08                               | 5,08                   | 10,03               |
|   | <i>Euro Info Centres</i>         | 5,37                                | 5,08                   | 5,26                |
|   | <i>Training Centres</i>          | 21,48                               | 20,34                  | 23,81               |
|   | <i>Local Politicians</i>         | 17,45                               | 5,08                   | 16,29               |

In the same Table we present the opinion of the firms about the size of the city in which they are located. About 16% of the capital region firms, 33% of the border region firms and 31% of the total declare that they would prefer their city to be larger, after being warned that this implies more customers but also more competitors. The significantly higher proportion of firms in border regions (and total sample) preferring their city to be larger is an indication of the existence of agglomeration economies, as a larger market size is associated with a more successful operation of the firm. Similar

conclusions can be reached from the shares of the firms reporting that they prefer to be in a different city.

Finally, in the same Table we report the shares of the firms in capital regions, border regions and total sample that have received assistance from local scientific and business support institutions. Evaluating these institutions at the level of the total sample we observe first, that some of them have closer links with the local productive base than others. Firms tend to receive more often assistance from banks (57%), chambers of industry (41%), local/regional government (32%) and training centers (23%). About one in every six firms declares that it has received assistance from Universities, Research centers or Business service centers. A similar ratio reports assistance from politicians, while Euro Info Centers stand alone at the bottom of the list, providing assistance to one in every 20 firms. Obviously, local institutions that provide more traditional or more basic types of assistance have developed better links with firms than those providing more specialized or more advanced services. Given that these institutions are relatively new, or have a new role in transition countries, the support they provide to private sector firms is by no means trivial. If the figures of the Table can be an indication of the realities in these countries, it is very likely that the local science base and the local business support base are playing a significant role in transmitting knowledge in the new markets.

The second observation we can make from the Table is that firms located in capital regions have greater or significantly greater access to services provided by local science and business support institutions than firms located in the western borders. The latter, have less access to these services and receive less support than the average firm of our sample, despite the fact that they evaluate the need for a quality local science and business support base higher than capital firms (see Table A1 in Appendix). This indicates that learning from the environment or external learning is a process directly affected by locality and agglomeration economies. The availability and quality of science and business support institutions in metropolitan regions most likely generates advantages to local firms that are not always available to firms located in the peripheral border regions. As a result learning from others processes in transition countries seem to have a strong spatial dimension, to the extent that metropolitan regions offer more opportunities for learning spillovers to their firms than other peripheral regions, including western border regions.

To the extent that the information in Tables 3 and 4 can be generalized, it provides some indication that the economic space in transition economies is to some extent divided when learning by doing and learning from others processes are concerned. Despite the advantages of western border regions with respect to the other peripheral regions in CEE countries and especially eastern border regions (Petrakos 1998, Names-Nagy 1999), their comparison to metropolitan regions (but also to average sample figures) is not favorable. Internal learning and learning from the environment seem to be spatially selective processes, favoring metropolitan regions or other large markets and concentrations of activities, adding new layers of disparities to an already divided space.

In Table 5 we present information concerning the spatial aspects of enterprise characteristics related to learning from networks. The Table reports the responses of the firms related to aspects of their operation or behavior indicating inter-firm interaction and learning. Starting with the figures of the total sample, we observe first, that the average firm in the sample has exports equal to about 24% of its total sales, indicating a significant interaction with international markets. We also observe that about 20% of the respondents report having some type of foreign participation in their firm, while 16% report that their firm has participated in a joint venture in the last two years. About 38% of the firms subcontract part of their production to other firms, while 47% of the firms take as subcontractors part of the production of other firms. To the extent that these figures relate to the actual conditions of the enterprise sector in transition countries, they indicate a relatively dense interaction not only between domestic firms, but also between domestic and international firms. Second, with the exception of firms reporting export activities and some sort of foreign participation, the shares of the firms indicating some sort of inter-firm interaction in capital regions and western border regions are very similar to those of the total sample. This might be an indication that the positive externalities accruing to firms from their interaction and participation in networks do not depend so much on locality. As networks of 'variable geometry' manage to overcome the restrictions of physical space (Castels 1996), they appear more likely to provide equal opportunities for beneficial interaction to peripherally located firms, opportunities that were not that 'equally' provided by the previously examined types of learning.

The differences however, between the capital and border region firms reporting export activity and foreign participation are worth a further comment. Perhaps the most frequently cited advantage of western border regions in transition countries is the combination of proximity to western markets and the low cost base of these regions. This combination has been considered as a 'pull' factor attracting foreign direct investment to border regions in a volume that could be competing with the attractiveness of metropolitan regions (Petrakos 1996). Our data shows that the advantages of border regions are not sufficient to balance the attractiveness of the metropolitan regions, which is based on agglomeration economies and the existence of a large and relatively developed domestic market. It may also indicate that foreign capital is more interested in the domestic market of the transition countries (which favors location in the metropolitan region or the other large markets) than their low cost production base (which favors location in the western borders). Despite, however, lower shares of foreign participation, border region firms report more intensive export activities, taking advantage of their low cost base and specializing in labour-intensive or mass-production goods (Jackson and Petrakos 1999, Landesmann 1998). This assertion is also supported by the fact that border region firms have on average a larger employment size (93 employees) than capital region firms (76 employees) and total sample firms (83 employees).

In the same Table we also report the share of firms in capital and border regions and in the total sample that have some of their functions, such as marketing, accounting, legal advice, tax affairs, technical support or product distribution performed by outsiders. We observe that more than half of the firms in our sample have externalized legal services, while about one third have externalized tax affairs and technical



support services. One in six firms have externalized accounting and product distribution, while one in ten firms have externalized marketing. Given that the average firm in our sample employs a little more than 80 persons (which is by no means a small firm), these figures are impressive.

**Table 5. Spatial aspects of Enterprise characteristics related to learning from networks**

| <i>Enterprises characteristics:</i>   |                                 |                                     | <i>(Share of) firms operating in:</i> |                        |                     |
|---|---------------------------------|-------------------------------------|---------------------------------------|------------------------|---------------------|
|   |                                 |                                     | <i>Capital region</i>                 | <i>Western borders</i> | <i>Total sample</i> |
| <i>Average share of exports in sales</i>  |                                 |                                     | 21,88                                 | 29,21                  | 24,35               |
| <i>Foreign participation in the firm</i>  |                                 |                                     | 24,16                                 | 13,56                  | 20,55               |
| <i>Participation in a joint venture in the last 2 years</i>                           |                                 |                                     | 15,44                                 | 13,56                  | 16,29               |
| <i>A part of production is given in the form of subcontracting to other firms</i>     |                                 |                                     | 36,91                                 | 35,59                  | 38,10               |
| <i>The firm takes part of the production of other firms as subcontractor</i>          |                                 |                                     | 51,01                                 | 49,15                  | 47,87               |
| <i>Enterprise functions performed by outsiders:</i>                                   | <i>(a) marketing</i>            |                                     | 8,05                                  | 3,39                   | 10,03               |
|   | <i>(b) accounting</i>           |                                     | 19,46                                 | 28,81                  | 17,79               |
|   | <i>(c) legal advice</i>         |                                     | 50,34                                 | 61,01                  | 54,14               |
|   | <i>(d) tax affairs</i>          |                                     | 28,86                                 | 35,59                  | 29,32               |
|   | <i>(e) technical support</i>    |                                     | 30,87                                 | 37,29                  | 29,32               |
|   | <i>(f) product distribution</i> |                                     | 13,42                                 | 18,64                  | 17,04               |
| <i>The firm discusses production needs with suppliers (very often)</i>                |                                 |                                     | 55,03                                 | 67,80                  | 55,14               |
| <i>The firm discusses the quality of its products with customers (very often)</i>     |                                 |                                     | 64,43                                 | 27,12                  | 66,17               |
| <i>There is room for cooperation with firms in the same business in the field of:</i> | <i>(a) joint production</i>     | <i>With local firms</i>             | 22,15                                 | 32,20                  | 24,81               |
|   |                                 | <i>With firms located elsewhere</i> | 33,56                                 | 13,56                  | 29,57               |
|   | <i>(b) joint marketing</i>      | <i>With local firms</i>             | 14,09                                 | 22,03                  | 16,04               |
|   |                                 | <i>With firms located elsewhere</i> | 18,12                                 | 16,95                  | 17,79               |
|   | <i>(c) joint supplies</i>       | <i>With local firms</i>             | 21,48                                 | 28,81                  | 22,31               |
|   |                                 | <i>With firms located elsewhere</i> | 14,09                                 | 22,03                  | 16,79               |
|   | <i>(d) know-how sharing</i>     | <i>With local firms</i>             | 20,13                                 | 15,25                  | 16,04               |
|   |                                 | <i>With firms located elsewhere</i> | 18,79                                 | 13,56                  | 15,04               |

There may be early signs of a new type of local economic integration through a firm-level vertical disintegration, which has come in a relatively short period of time to replace the perceptions of scale economies and internal division of labor that were so dominant under central planning. The fact that a significant share of firms prefers to



use the market in order to obtain specialized services, instead of providing them internally (although their size does not *a priori* exclude such an option), is a real break with the industrial tradition in these countries and an understanding that market transactions produce better results in fields where knowledge is highly specialized or changes rapidly.

How do the capital and border region firms respond compared to the total number of the sample? Our figures indicate that, with the exception of marketing, border region firms tend to externalize services in significantly larger proportions than capital region and total sample firms. This relative flexibility of border region firms compared to those in the capital region, might be interpreted as an effort to learn from market interaction and local networks, given that the provision of these (non-tradeable) services is to a large extent a local market affair. To the extent that this interpretation is realistic, it can be used as another indication that networks provide a more friendly mode of learning for peripheral regions than internal learning efforts or the local science and business support base do.

The rest of the Table provides information about producer-suppliers and producer-customers relationships, as well as the firms' position towards inter-firm cooperation. Starting from the former, we observe that capital region firms have developed relatively closer links with their customers, while border region firms have closer links with their suppliers. These differences in relations are expected and in fact are driven by distance and communication barriers. Capital region firms operate in large markets and have more opportunities to physically contact their customers that are nearby and therefore accessible. The opposite is the case for border region firms that often sell to international markets or distant domestic markets. As a result, these two groups of firms seem to develop forward and backward links in different proportions for reasons that are related to their geographical coordinates.

The firms' position towards cooperation with respect to joint production, joint marketing, joint supplies and know-how sharing reveals some interesting features. In general the various types of cooperation are considered a useful option by a significant share of firms in our sample, ranging from 29% favoring cooperation in joint production to 15% favoring cooperation in know-how. From the spatial point of view however, it is interesting to observe that border region firms have systematically a more favorable standing in all types of cooperation (except know-how sharing) when cooperation concerns local firms. Indeed, 32% of the border region firms favor cooperation with local firms in joint production (compared to 22% of capital region firms), 22% of border region firms favor cooperation with local firms in joint marketing (compared to 14% of capital region firms) and 28% of them favor cooperation with local firms in joint supplies (compared to 21% for capital firms). It is interesting that, when the question comes to cooperation with firms located elsewhere, border region firms are in general less enthusiastic.

This might be an indication that the formation of networks is easier when a common sense of identity (expressed by common problems and locality) is present and it is more difficult for peripheral regions when the flow of information is asymmetric. These figures also reveal that networking intentions in our sample are not random but selective and are most likely based on well-defined criteria and needs. There are two examples that may justify this statement. The first is related to the behavior of border

region firms. Despite their stronger preference for local cooperation, when the question comes to know-how sharing, their interest is relatively weak, obviously because they realize that there is not much additional (outside their control) knowledge in the region to derive any real benefits from this type of cooperation. The second example comes from the behavior of the capital region firms. While in the fields of production and marketing they have an expansionist logic, preferring to cooperate with firms located elsewhere, in the fields of supplies and know-how they prefer to cooperate with local firms. This shift is explained by their interest in cutting transportation cost related to raw materials, and their understanding that there is not much know-how available in (domestic) markets outside the metropolis.

### *Knowledge self-evaluation and success in implementing changes*

How do firms rate their knowledge with respect to specific aspects of their operation or their environment? Judging from the responses of the entrepreneurs/managers in Table 6, we can say that the firms in our sample consider the level of their knowledge in general satisfactory.

**Table 6. Self evaluation of existing knowledge**

| <i>The entrepreneur/manager evaluates existing knowledge within the firm with respect to:</i> |  | <i>Share of firms operating in:</i> |                        |                     |
|---|--|-------------------------------------|------------------------|---------------------|
|   |  | <i>Capital region</i>               | <i>Western borders</i> | <i>Total sample</i> |
| <i>Management methods</i>   | <i>-Good, very good or excellent</i>   | 82,55                               | 74,58                  | 76,19               |
|   | <i>- Inadequate, poor or very poor</i> | 16,11                               | 15,25                  | 20,55               |
|   | <i>-No answer/don't know</i>           | 1,34                                | 10,17                  | 3,26                |
| <i>Marketing methods</i>  | <i>-Good, very good or excellent</i>   | 63,76                               | 57,63                  | 61,15               |
|   | <i>- Inadequate, poor or very poor</i> | 34,23                               | 32,20                  | 34,59               |
|   | <i>-No answer/don't know</i>           | 2,01                                | 10,17                  | 4,26                |
| <i>Accounting and finance</i>   | <i>-Good, very good or excellent</i>   | 78,52                               | 74,58                  | 77,94               |
|   | <i>- Inadequate, poor or very poor</i> | 20,13                               | 15,25                  | 19,30               |
|   | <i>-No answer/don't know</i>           | 1,35                                | 10,17                  | 2,76                |
| <i>The operation of the market</i>  | <i>-Good, very good or excellent</i>   | 59,06                               | 59,32                  | 57,39               |
|   | <i>- Inadequate, poor or very poor</i> | 37,58                               | 28,81                  | 36,34               |
|   | <i>-No answer/don't know</i>           | 3,36                                | 11,87                  | 6,27                |

About 76% of the firms consider the level of knowledge with respect to management methods in the range of good-to-excellent, while a similar view have 61% (77%) of the firms of the level of knowledge with respect to marketing (accounting and finance) methods. A somewhat lower share (57%) declares a good-to-excellent range

of knowledge related to the operation of the market. On the other hand, only one in five firms declares knowledge in the inadequate-to-very poor range with respect to management or accounting/finance methods and one in three firms expresses similar concern for their knowledge of marketing and the operation of the market.

These figures are in general very high. Even if one reduces/deflates their face value, accepting an inherent bias or even a subjective judgement of what “excellent” knowledge is on behalf of the respondents, they still indicate a rapid expansion of entrepreneurial learning in transition countries in a relatively short period of time.

The figures in Table 6 also indicate that the diffusion of knowledge over space is not likely to be even. Capital region firms have a greater propensity to self evaluate the level of their knowledge in the range good-to-excellent with respect to various aspects of their operation than firms in the western border regions and total sample firms do. Western border region firms evaluate their knowledge in the range good-to-excellent less often than both capital and total sample firms in all aspects of their operation, except knowledge of the market. At the same time it is interesting to observe that capital region firms admit more often than border region firms do an inadequate-to-very poor knowledge level. On the other hand, a higher share of border region firms does not answer this question, being most likely unable to evaluate the level of their knowledge. This seems to indicate that capital region firms have a more clear view/opinion about the level of their knowledge, while border region firms are relatively more uncertain. The last observation is also directly related to the diffusion of information and knowledge in space and serves to support our earlier conclusions.

Finally, in Table 7 we present the reports of entrepreneur/managers regarding the implementation of changes in products or processes during the last two years and their evaluation of the results of these changes. We observe that the changes made most frequently are related to the number of the products (73% of the sample) and type of products sold (70%), the use of advanced equipment (64%) and the method of production (60%) (in this order). The less frequently reported changes concern the distribution of the products (37% of the sample), finance (39%) and marketing (40%) (in this order). The great majority (75-85%) of firms that have implemented a change declare that they find its results satisfactory.

Going to the spatial level, we see that the capital region firms in general have a greater propensity to implement changes than western border regions in all areas except management. However the differences between the two groups are not very strong, except in the case of finance. We also see that border region firms have in general a lower propensity to implement changes than the total number of firms in our sample. Satisfaction from the implemented changes is, generally speaking, in high levels in both regional groups, with a tendency for border region firms to express higher satisfaction for relatively simple types of changes, and the capital region firms to express higher satisfaction for relatively more sensitive/advanced types of changes.

**Table 7. Successful implementation of changes in the firm**

| <i>The entrepreneur/manager reports changes made during the last two years in the following areas and evaluates their success:</i> |                              | <i>Share of firms operating in:</i> |                        |                     |
|--|------------------------------|-------------------------------------|------------------------|---------------------|
|  |                              | <i>Capital region</i>               | <i>Western borders</i> | <i>Total sample</i> |
| <i>Type of products sold</i>   | <i>Major or small change</i> | 71,14                               | 64,41                  | 70,68               |
|  | <i>Satisfying results</i>    | 83,96                               | 86,84                  | 85,82               |
| <i>Number of products sold</i>   | <i>Major or small change</i> | 73,83                               | 67,80                  | 73,68               |
|  | <i>Satisfying results</i>    | 80,00                               | 82,50                  | 77,89               |
| <i>Method of production</i>  | <i>Major or small change</i> | 55,03                               | 55,93                  | 60,65               |
|  | <i>Satisfying results</i>    | 80,49                               | 87,88                  | 76,86               |
| <i>Use of advanced equipment-machinery</i>   | <i>Major or small change</i> | 65,10                               | 64,41                  | 64,91               |
|  | <i>Satisfying results</i>    | 82,47                               | 71,05                  | 81,15               |
| <i>Method of management</i>  | <i>Major or small change</i> | 41,61                               | 47,46                  | 47,37               |
|  | <i>Satisfying results</i>    | 77,42                               | 85,71                  | 75,66               |
| <i>Method of product promotion-marketing</i>   | <i>Major or small change</i> | 37,58                               | 35,59                  | 40,60               |
|  | <i>Satisfying results</i>    | 73,21                               | 66,67                  | 74,07               |
| <i>Method of product distribution</i>  | <i>Major or small change</i> | 38,26                               | 32,20                  | 37,84               |
|  | <i>Satisfying results</i>    | 84,21                               | 68,42                  | 80,14               |
| <i>Relations with suppliers</i>  | <i>Major or small change</i> | 47,65                               | 45,76                  | 48,62               |
|  | <i>Satisfying results</i>    | 85,92                               | 77,78                  | 81,44               |
| <i>Relations with workers</i>  | <i>Major or small change</i> | 45,64                               | 38,98                  | 44,61               |
|  | <i>Satisfying results</i>    | 79,41                               | 73,91                  | 78,09               |
| <i>Method of financing your firm</i>   | <i>Major or small change</i> | 43,62                               | 23,73                  | 39,60               |
|  | <i>Satisfying results</i>    | 76,92                               | 64,29                  | 75,32               |

As it can be seen in the Appendix (Table A2), the firms have an opinion about the factors contributing to successful implementation of changes or the successful operation of business in general. The most often reported factors are: (1) having good ideas and work hard, (2) choose the right partners and staff, (3) have the right connections, (4) take risks, and (5) operate in specialized markets. The ranking of factors, however, is not the same for capital and border regions, as the former tend to favor more often a 'modern' type of arguments and the latter a 'traditional/less modern' type of arguments explaining success.



#### 4. An econometric model of enterprise learning in transition.

The aim of this section is to identify in a more quantifiable way the factors that have the greatest influence on enterprise learning in transition countries and relate them to our previous analysis concerning the three types of learning and their spatial dimension. To accomplish this task, we are using a multiple regression model. Using models to identify the sources of enterprise learning is an ambitious task that, however, has a number of constraints and drawbacks. First, as pointed by Garnsey (1998), linear relations between preconditions and outcomes have a limited value when outcomes feed back as further causes in a cumulative manner. Second, the extent of successful learning on the part of firms, despite the fact that it must be assessed for the purpose of policy making, is not an easily measured variable (Dodgson and Bessant 1996).

Nevertheless, a number of studies have used quantitative and qualitative measures to cope with this issue. Dodgson and Bessant (1996) suggest that quantitative measures of learning should include a commitment to introduce *changes in processes and products*, while qualitative measures should include *improvements in knowledge* necessary to run the firm and cope with an increasingly complicated market environment. Linz and Biddle (1998) in their analysis of new product development and product imitation in a Russian province, used as dependent variable the *individuals' responses* concerning the pace of *new product development* and product imitation in their workplaces, while Konstandakopoulos (1997) in his study of two peripheral British regions used as dependent variable a qualitative measure of innovation activities.

The existing empirical literature has used a variety of independent variables and has tested for their impact on learning and innovation processes. Linz and Biddle (1998) used in their analysis characteristics of the work environment as independent variables. Audretsch and Feldman (1996) in their study of the spatial concentration of innovative industries used as independent variables the size of the firms as a proxy for scale economies, a measure of labor force skills and transportation cost and a proxy for University research. Finally, Konstandakopoulos (1997) used as independent variables the age of the firm, the skills of the staff, a dummy for the existence of an R&D department, the distance of firms from London and their exports.

As has been already discussed, previous studies have provided empirical evidence for the importance of structural, behavioral and spatial factors for innovation and learning. Our analysis in this section contributes to this literature in two ways. First, it attempts to test for the individual influence of factors related to all three types of entrepreneurial learning (internal, external and from networks) and assess their relative importance. Second, it uses for the first time a relatively large and multinational sample in order to examine the importance of factors that are considered to be affecting entrepreneurial knowledge in transition countries. In order to test our hypotheses, we are using a multiple regression model of the form:

$$Y_i = a + \sum b_i X_i + \sum d_i W_i + \sum h_i Z_i + \sum g_i V_i + \varepsilon_i \quad \varepsilon_i \sim N(0, \sigma^2_\varepsilon),$$

where  $Y_i$  is a measure of enterprise learning,  $X_i$  are a set of independent variables expected to affect internal learning or learning by doing,  $W_i$  is a set of independent variables expected to affect learning from the environment,  $Z_i$  is a set of independent variables expected to affect learning from networks and  $V_i$  are a set of independent spatial or control variables.

Following the suggestion of Dodgson and Bessant (1996), we construct a dependent entrepreneurial learning variable ( $Y$ ), which is measured as the weighted index of (a) self evaluation of entrepreneurs/managers concerning the level of their knowledge with respect to a number of methods and operations (presented in Table 6) and (b) reported successful implementation of changes introduced in the firm with respect to products and processes (presented in Table 7). Therefore the measure of entrepreneurial learning is a composite index constructed on the basis of questionnaire responses, that attempts to measure both the level of existing knowledge and the success of implementing changes. Further information about the construction of the dependent variable is given in the Appendix.

As independent variables, we considered a large number of factors in the internal and external environment of the firms for which our analysis and the literature suggest that that they are likely to affect learning. For these factors we have available information either from the responses of the entrepreneurs/managers, or from collected regional statistics. These factors are grouped in Table 8 in four categories, related to the type of learning that they are likely to stimulate and the presence of control or spatial variables. Given that all these factors have been directly or indirectly considered by the literature to affect learning, we do not have a priori expectations for their ranking and their importance in the case of enterprise learning in transition countries. Obviously, the availability of such a large number of independent variables, representing both behavioral and structural factors, is a rare situation in this type of research and gives rise to hopes for a more complete set of hypothesis testing. However the inclusion of 30 independent variables in a linear model is severely constrained by multicollinearity problems that hinder our efforts to identify their true effects on the dependent variable. Linz and Biddle (1998) who eventually used several regressions, excluding from each one a number of independent variables faced similar problems.

To deal with this problem, we first run a model with all independent variables (not reported), which is used to identify the collinearity level of each one with the others. Then we engage in a process of removing variables that have both insignificant influence and also exhibit strong collinearity with the others. After repeated runs, we report in Table 9 the results of a representative set of best-fit models.

The examination of these results allows us to make a number of interesting observations. First, we see that despite the large number of independent variables that are found to have a statistically significant impact on enterprise learning, the overall explanatory variable of the model, as shown by the adjusted coefficient of determination ( $R^2$ ), is relatively limited. This implies that there are other factors, not captured by our analysis, which affect or explain a large part of the variation of the dependent variable. These factors, to the extent that they are not random but are related to some important aspects of the internal or external environment of the firms, should be the subject of future investigation.

Second, we see that the larger group of variables with a statistically significant impact on Y is related to internal learning, while the smallest group is related to learning from networks. Given that our analysis in section 3 has already indicated that the former group of factors is more likely to be spatially differentiated than the latter, our first feeling from the results of the model is that the factors generating enterprise learning do not favor a spatially balanced development path.

**Table 8. The independent variables of the model**

| <u>Variables related to learning by doing or internal learning</u>             |  |
|--|--|
| $X_1$  | Economies of scale (employment size)                                   |
| $X_2$  | Experience (years of operation)  |
| $X_3$  | Foreign languages the entrepreneur/manager speaks                      |
| $X_4$  | The entrepreneur/manager has received post-secondary education         |
| $X_5$  | The entrepreneur/manager has studied abroad                            |
| $X_6$  | The entrepreneur/manager has worked in a western country               |
| $X_7$  | The entrepreneur/manager reads international newspapers/magazines      |
| $X_8$  | Share of employees with a university degree                            |
| $X_9$  | Existence of Department or staff dedicated to R&D                      |
| $X_{10}$   | Existence of Department or staff dedicated to product design           |
| $X_{11}$   | Existence of training programs for the employees                       |
| $X_{12}$   | Quality of labour-management relations                                 |
| <u>Variables related to learning from the environment or external learning</u> |  |
| $W_1$  | The size of the host city (agglomeration economies)                    |
| $W_2$  | Gross Regional Product per head in the host region (development level) |
| $W_3$  | Assistance received from the local science and business support base   |
| <u>Variables related to learning from inter-firm networks</u>                  |  |
| $Z_1$  | Share of exports in total sales  |
| $Z_2$  | Foreign participation  |
| $Z_3$  | Participation in a joint venture                                       |
| $Z_4$  | Subcontracting to other firms  |
| $Z_5$  | Subcontractor for other firms  |
| $Z_6$  | Stable relations with suppliers  |
| $Z_7$  | Discuss with suppliers production needs                                |
| $Z_8$  | Discuss with customers production needs                                |
| <u>Variables related to spatial aspects of learning or control variables</u>   |  |
| $V_1$  | Local availability of hard and soft infrastructure                     |
| $V_2$  | Distance from the capital  |
| $V_3$  | Distance from western borders  |
| $V_4$  | Distance from closest airport  |
| $V_5$  | Number of competitors in the market                                    |

Looking more specifically at the individual explanatory variables we see, first, that the size of the firm ( $X_1$ ) is a statistically significant factor affecting learning in all models. This indicates that economies of scale and a minimum internal division of labour are necessary conditions for the efficient transmission of knowledge and the successful implementation of changes in products and processes. On the other hand, experience ( $X_2$ ), measured by the years in operation, seems to play no significant role

in enhancing learning, perhaps due to the limited time available in the post-1989 period to the new firms to accumulate knowledge.

**Table 9. Regression results**

*Dependent variable: enterprise learning in transition countries*

| <i>Independent variables</i>  | <i>Model 1</i>             |                | <i>Model 2</i>             |                | <i>Model 3</i>             |                | <i>Model 4</i>             |                |
|-------------------------------|----------------------------|----------------|----------------------------|----------------|----------------------------|----------------|----------------------------|----------------|
|                               | <i>Parameter estimates</i> | <i>t-value</i> | <i>Parameter estimates</i> | <i>t-value</i> | <i>Parameter estimates</i> | <i>t-value</i> | <i>Parameter estimates</i> | <i>t-value</i> |
| <i>Constant</i>               | 33.558*                    | 10.21          | 23.202*                    | 3.56           | 25.717*                    | 6.74           | 23.611*                    | 5.91           |
| <i>X<sub>1</sub></i>          | 0.004**                    | 2.25           | 0.004**                    | 2.26           | 0.004**                    | 2.12           | 0.003**                    | 1.93           |
| <i>X<sub>2</sub></i>          | -0.035                     | -1.36          | -0.032                     | -1.28          | -0.029                     | -1.17          | -0.035                     | -1.41          |
| <i>X<sub>3</sub></i>          |                            |                |                            |                | 0.943**                    | 1.93           | 0.396                      | 0.743          |
| <i>X<sub>7</sub></i>          |                            |                | 2.855*                     | 3.03           |                            |                | 2.547*                     | 2.52           |
| <i>X<sub>9</sub></i>          | 3.313*                     | 3.14           | 2.215**                    | 2.16           | 0.363                      | 0.319          | 0.412                      | 0.363          |
| <i>X<sub>10</sub></i>         |                            |                |                            |                | 3.485*                     | 3.28           | 3.350*                     | 3.16           |
| <i>X<sub>12</sub></i>         |                            |                | 3.377*                     | 5.29           | 2.923*                     | 4.60           | 2.936*                     | 4.63           |
| <i>W<sub>1</sub></i>          | 0.001**                    | 2.00           | 0.0009                     | 1.19           | 0.0003                     | 0.36           | 0.0002                     | 0.205          |
| <i>W<sub>2</sub></i>          | 0.364*                     | 3.39           | 0.286*                     | 2.75           | 0.421*                     | 3.92           | 0.386*                     | 3.48           |
| <i>W<sub>3</sub></i>          | 0.242*                     | 3.86           | 0.289*                     | 4.78           | 0.253*                     | 4.26           | 0.274*                     | 4.59           |
| <i>Z<sub>2</sub></i>          | 3.759*                     | 3.57           | 2.84*                      | 2.73           | 3.893*                     | 3.60           | 3.596*                     | 3.31           |
| <i>Z<sub>7</sub></i>          | 2.432*                     | 3.14           | 2.458*                     | 3.33           | 2.247*                     | 3.06           | 2.211*                     | 3.02           |
| <i>V<sub>1</sub></i>          | 0.362*                     | 3.85           | 0.305*                     | 3.36           | 0.283*                     | 3.15           | 0.290*                     | 3.22           |
| <i>V<sub>2</sub></i>          |                            |                |                            |                |                            |                | -0.0007                    | -0.200         |
| <i>V<sub>3</sub></i>          |                            |                |                            |                | 0.005**                    | 1.90           | 0.006**                    | 1.95           |
| <i>V<sub>4</sub></i>          |                            |                |                            |                | -2.84**                    | -2.27          | -2.635**                   | -2.112         |
| <i>V<sub>5</sub></i>          | 2.105                      | 3.78           | 1.779                      | 3.32           | 1.726*                     | 3.26           | 1.614*                     | 3.05           |
| <i>R<sup>2</sup> adjusted</i> | 0.23                       |                | 0.29                       |                | 0.32                       |                | 0.32                       |                |
| <i>N</i>                      | 383                        |                | 383                        |                | 383                        |                | 383                        |                |

\* Statistically significant at 1% confidence interval

\*\* Statistically significant at 5% confidence interval

\*\*\* Statistically significant at 10% confidence interval

Our models provide also some evidence that qualitative characteristics of the entrepreneur/manager, such as his ability to speak one or more foreign languages (*X<sub>3</sub>*) and be informed by international sources (*X<sub>7</sub>*), have a significant influence on the firms' ability to learn. We note, however, that these two variables show some correlation, which does not allow an accurate estimation of their independent influence.



Similarly, the existence of department or staff dedicated to R&D ( $X_9$ ) or product design activities ( $X_{10}$ ), seem to be factors affecting enterprise learning in a statistically significant way. The tendency of the firms with R&D departments to also have product design departments, makes these two variables strongly correlated and does not allow us to estimate the actual independent impact of each one.

The last among the internal factors that have been found to significantly affect learning is the quality of labour-management relations ( $X_{12}$ ). According to our models, good labour-management relations inside the firm stimulate learning in a significant way, obviously through a better communication and cooperation of the various types of human resources in workplaces.

The independent variables related to external learning that have been included in the model are the size of the host city ( $W_1$ ) and the GRP per head of the host region ( $W_2$ ), measuring agglomeration economies and development level and the level of assistance firms have received from the local science and business support base<sup>6</sup> ( $W_3$ ). Our models provide evidence that these three factors (especially the last two) have a statistically significant impact on the ability of local firms to learn. Although the impact of city size becomes insignificant in models 2-4, this is most likely attributed to the correlation of this variable with variables  $X_3$ ,  $X_7$  and  $X_{12}$ , which, as we have seen in section 3, have a strong spatial dimension. Our findings indicate that firms are more likely to have a better learning record in large and developed areas, providing a wider set of support facilities, institutions and services to private sector activities. These results are in line with the regional development and policy literature, which has long emphasized the significance of agglomeration economies and the role of public or private support institutions at the local level.

The only independent variables related to networks, which repeated runs have found to exert a statistically significant impact on enterprise learning, are foreign participation ( $Z_2$ ) and close supplier-producer relations ( $Z_7$ ). These variables, which have a systematic impact in all models, indicate that some types of inter-firm interaction have the ability to enhance enterprise learning in transition countries. The first type is related to the direct transmission of knowledge from international sources, through foreign participation in the firms' capital. Although this source of learning is found to be an important one, it is by no means related to the traditional understanding of dense local inter-firm relations proposed by the 'milieu' school to play a significant role in promoting local development. Learning through foreign participation in the capital of the firms refers to other types of networks, that are mainly international and frequently have their connecting nodes abroad. Moreover, as we have seen in section 3, these networks are selective in nature, showing a preference for firms located in capital regions. Producer-supplier relations is the only significant source of learning that could, besides improving the performance of the firms, fit the 'milieu' concept of development through the creation of dense networks of locally interacting firms.

Our last set of variables includes factors related to the spatial aspects of learning as well as control factors. Examining our results, we see that four of them have a

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<sup>6</sup> This variable is derived from information provided in Table 4. It is measured as the sum of the positive responses to the question whether the firms have received assistance from 11 different institutions or sources.

significant influence on our dependent variable. First, hard and soft infrastructure<sup>7</sup> ( $V_1$ ) that is considered as valuable by the firms is found to have a consistently significant impact on enterprise learning in all models. To the extent that this finding can be interpreted as a significant relation between local infrastructure provision and enterprise learning, it sets the priorities for regional policies in transition countries. Second, location at a distance from the capital region ( $V_2$ ), despite all indications in section 3, does not receive any statistical support as an explanatory variable in repeated models. This could, however, be attributed to the fact that a number of other explanatory variables have a spatial dimension, which does not allow distance to show its true independent impact. Third, location by the western borders or near the western borders of these countries ( $V_3$ ), was included in the model in an effort to capture any dynamic effects this location might generate to firms from a potentially higher level of interaction with Western Europe. As the variable is measured in terms of distance from the western borders, the expectation was a lower distance to be associated with a higher level of learning. That is, the expected sign was negative. The estimated models however have produced systematically a positive (and in several cases significant) sign, which indicates that the further away from the borders a firm is located, the more likely it is to have a higher value of the dependent learning variable. We are not very sure how we should interpret this finding. One explanation is that this variable captures in fact the disadvantages of peripherally located firms in terms of the diffusion of information and knowledge. Third, distance from airport ( $V_4$ ) has been found to have a statistically significant and negative impact on learning. That is, the further away from airports a firm is located, the less likely it is to benefit from learning spillovers.

The last variable that has been included in the model and found to be statistically significant is related to the structure of the market ( $V_5$ ). The consistently positive and significant coefficient indicates that as the market of competitors of the firm increases (that is the firm operates in a more competitive market), the learning spillovers are greater. This provides evidence that competition in market economies generates knowledge that is eventually transmitted to firms through market interaction. This finding serves to provide further support to the argument that monopoly power is not required to promote learning and innovation (Harris and Trainor 1997).

## 5. Conclusions and policy implications

This paper has investigated the types and sources of enterprise learning in transition countries, paying special attention to its spatial aspects. In section 2 we have proposed a taxonomy of three types of learning: internal, from the environment and from networks and have reviewed the relevant literature. In section 3 we have used a database of 399 firms from 6 transition countries, in order to analyze the spatial aspects of behavioral and structural factors that are related to enterprise learning. In this section, we contrast capital region firms to western border region firms because the latter are considered in the literature to have a greater potential than other border regions in transition countries, partially balancing their disadvantage of perimetric

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<sup>7</sup> This variable is based on information provided in the Appendix (Table A1). It is measured by the relative weight entrepreneurs/managers put to nine different types of hard and soft infrastructure. The weight is related to their importance for the operation of their firm.

location with the advantage of proximity to the western European markets. Finally, in section 4 we have estimated an econometric model, in an effort to improve our knowledge of the importance of the factors that are considered to affect learning. The basic findings and the consequent policy implications of this paper are the following.

First, our econometric results show that both structural and behavioral factors are found to be important for enterprise learning. However, structural factors (including those with an explicit spatial dimension) seem to exert a greater influence on learning processes. If one excludes the variables X3, X7 and X12, that are more related to the characteristics of the firms' management and variables Z2 and Z3 that are related to inter-firm relations, the remaining variables can be characterized as structural or spatial. That is, their impact is related to more fundamental economic or spatial factors beyond the control of the individual firms. This indicates that enterprise learning is not only an internal affair of the enterprises themselves, but also a social affair, requiring public policies of a specific type and focus.

Second, most structural and spatial factors, but also some of the behavioral factors tend to favor metropolitan regions. As the analysis in section 3 has indicated, internal learning and learning from the environment are more or less spatially selective processes, favoring metropolitan regions or other large markets and concentrations of activities, adding new layers of disparities to an already divided space. The only learning factors that tend to have a more spatially balanced behavior are those related to networks. Networks are a more friendly and accessible form of learning for peripheral regions than intra-firm learning or learning from the environment. However, the econometric model in section 4 has provided limited evidence of the importance of these factors in transition countries. It has also provided a lot of evidence of the importance of several factors related to internal learning, learning from the environment and spatial factors. Taking into consideration that all these factors related to human capital, agglomeration economies, local science and business support base, infrastructure provision and geographical coordinates tend to favor capital regions, we conclude that enterprise learning in transition countries will be developing in a spatially selective and unequal way.

Third, despite the presence of some behavioral characteristics referring to 'local milieu' and 'flexible specialization' concepts, there is limited evidence of their impact on learning. Local inter-firm networks are most likely in the making, especially in border regions, as a reaction to unfavorable geography and limited access to other types of learning. As early signs of a 'milieu' environment can be taken to be the good labour-management relations inside the firms, the intensive subcontracting, the partial externalization of firm functions and the close producer-supplier and producer-customer relationships. However, our model has been able to provide only limited evidence of their impact on enterprise learning. This evidence is basically related to good labour-management and dense producer-supplier relations.

Forth, spatial variations in enterprise learning indicate that transition policies have to gradually incorporate regional policies in their core, as a necessary supplementary (and often balancing) force to macroeconomic and structural policies. In doing this, they have to utilize all the experience of the west and especially the EU, which is more active (and some may add successful) in discussing and implementing regional policies. These policies have to ameliorate the disparities generated by markets and



geography, and promote, as Asheim (1996) has suggested, the creation of dynamic flexible learning organizations within firms, between firms in network and between firms and local society. Besides general-purpose public infrastructure, regional policies in transition countries have to focus on public goods specific to the technological-economic spaces of the regions (Storper 1995). Public goods of this type, include such knowledge-generating sources as R&D, university research and labour force training, region-specific assistance to firms and regional/local institutions, which generate or support capacities for more effective inter-firm cooperation and collective action.

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## APPENDIX

**Table A1. Evaluating the importance of hard and soft infrastructure: the spatial dimension**

| <i>The entrepreneur/manager opinion about the importance of the following infrastructure facilities for the effective operation of a new firm:</i> | <i>Share of firms operating in:</i> |                             |                        |                             |                       |                             |
|--|-------------------------------------|-----------------------------|------------------------|-----------------------------|-----------------------|-----------------------------|
|  | <i>Capital region</i>               |                             | <i>Western borders</i> |                             | <i>Total sample</i>   |                             |
|  | <i>Very important</i>               | <i>Relatively important</i> | <i>Very important</i>  | <i>Relatively important</i> | <i>Very important</i> | <i>Relatively important</i> |
| <i>Access to airports</i>  | 11,41                               | 23,49                       | 8,47                   | 8,47                        | 10,03                 | 19,05                       |
| <i>Quality of road network</i>   | 35,57                               | 49,66                       | 40,68                  | 37,29                       | 36,09                 | 47,12                       |
| <i>Quality of telecommunications</i>   | 58,39                               | 33,56                       | 64,41                  | 23,73                       | 60,15                 | 32,58                       |
| <i>Access to port and rail facilities</i>  | 6,04                                | 38,26                       | 13,56                  | 18,64                       | 9,77                  | 33,83                       |
| <i>Quality of local Universities and Colleges</i>  | 11,41                               | 36,91                       | 23,73                  | 28,81                       | 16,79                 | 33,08                       |
| <i>Availability and quality of Training Centres</i>  | 11,41                               | 40,27                       | 27,12                  | 28,81                       | 22,31                 | 35,59                       |
| <i>Availability and quality of Business Support Services</i>   | 17,45                               | 39,60                       | 35,59                  | 30,51                       | 29,57                 | 35,84                       |
| <i>Availability and Quality of Consulting Firms</i>  | 10,74                               | 32,21                       | 6,78                   | 42,37                       | 15,29                 | 34,09                       |
| <i>Availability and quality of Research Centres</i>  | 11,41                               | 36,24                       | 13,56                  | 32,20                       | 18,30                 | 33,83                       |

**Table A2. Evaluating factors contributing to new enterprise success: the spatial dimension**

| <i>The entrepreneur/manager opinion about the importance of the following factors for the successful operation of a new firm:</i> | <i>Share of firms operating in:</i> |                        |                     |
|---|-------------------------------------|------------------------|---------------------|
|   | <i>Capital region</i>               | <i>Western borders</i> | <i>Total sample</i> |
| <i>Have good ideas and work hard</i>  | 82,55                               | 76,27                  | 80,70               |
| <i>Operate in specialised markets</i>   | 41,61                               | 23,73                  | 35,59               |
| <i>The ability to take risks</i>  | 36,91                               | 45,76                  | 42,11               |
| <i>Choose the right partners or staff</i>   | 73,83                               | 57,63                  | 67,92               |
| <i>Be affiliated or cooperate with a foreign firm</i>   | 26,17                               | 25,42                  | 25,56               |
| <i>Have good relations with Banks</i>   | 26,85                               | 28,81                  | 32,33               |
| <i>Be located in fast growing areas</i>   | 21,48                               | 23,73                  | 24,56               |
| <i>Be located in large cities</i>   | 18,12                               | 11,86                  | 15,29               |
| <i>Have the right connections</i>   | 35,57                               | 62,71                  | 47,62               |
| <i>Be loyal to strong persons in government or business</i>   | 4,70                                | 11,86                  | 10,03               |
| <i>Operate in large markets of mass consumption</i>   | 14,09                               | 22,03                  | 20,55               |
| <i>Use cheap labour</i>   | 15,44                               | 15,25                  | 19,05               |
| <i>Be wealthy already</i>   | 13,42                               | 25,42                  | 19,80               |
| <i>Have few or no competitors</i>   | 14,09                               | 25,42                  | 16,79               |
| <i>Other</i>  | 1,34                                | 3,39                   | 5,26                |

## Appendix: Measuring learning as a dependent variable

The dependent variable  $Y$  is the weighted sum of the variable presenting self-evaluation of knowledge on behalf of entrepreneurs/managers ( $Y_1$ ) and the variable presenting the rate of success in implementing changes ( $Y_2$ ). That is,  $Y = [0.5Y_1 + 0.5Y_2]$ . In the following Tables we give an example of how  $Y_1$  and  $Y_2$  are estimated for each firm. These Tables are very similar to the ones of the questionnaire. The difference is that here each choice available to respondents (from excellent to very poor) is given a numerical value (from 5 to 0). In the first Table, the hypothetical firm that responds to this question with the X marks that appear in it, has a level of knowledge  $Y_1$  equal to 14. Obviously the maximum value of  $Y_1$  is equal to 20 and its minimum value is equal to 0.

**Table A3. Example for the construction of  $Y_1$**

| $Y_1 \rightarrow$ Knowledge with respect to:<br>(value assigned) $\rightarrow$ | excellent<br>(5) | very good<br>(4) | good<br>(3) | inadequate<br>(2) | poor<br>(1) | very poor<br>(0) |
|--|------------------|------------------|-------------|-------------------|-------------|------------------|
| Management methods   | X                |                  |             |                   |             |                  |
| Marketing methods  |                  | X                |             |                   |             |                  |
| Accounting/finance   |                  |                  |             | X                 |             |                  |
| Market operation   |                  |                  | X           |                   |             |                  |

In the second Table, success in implementing changes is measured as follows. Each level of change (major, small, no change) is assigned a numerical value (2, 1, 0). If the result of the change is considered successful by the entrepreneur/manager, then its value is multiplied by (+1). If the result of the change is not considered successful, then its value is multiplied by (+0.5). Obviously this arrangement implicitly assumes that non-successful changes are valued higher than no change at all. In the following Table the hypothetical firm has a  $Y_2$  value equal to 7.5, with 20 being its maximum and 0 its minimum possible value.

**Table A4. Example for the construction of  $Y_2$**

| $Y_2 \rightarrow$ changes made in the firm in the following areas during the past two years:<br>(value assigned) $\rightarrow$ | Major change<br>(2) | Small change<br>(1) | No change<br>(0) | In the case of a change are the results satisfying? |              |
|--|---------------------|---------------------|------------------|---|--------------|
|  |                     |                     |                  | Yes<br>(+1)   | No<br>(+0.5) |
| Type of products sold  | X                   |                     |                  | X   |              |
| Number of products sold  | X                   |                     |                  | X   |              |
| Method of production   |                     |                     | X                |   |              |
| Use of advanced equipment-machinery  |                     | X                   |                  | X   |              |
| Method of management   |                     | X                   |                  | X   |              |
| Method of product promotion-marketing  | X                   |                     |                  |   | X            |
| Method of product distribution   |                     |                     | X                |   |              |
| Relations with suppliers   | X                   |                     |                  | X   |              |
| Relations with workers   |                     |                     | X                |   |              |
| Method of financing your firm  |                     | X                   |                  |   | X            |



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